COLUMBIA | ENGINEERING
The Fu Foundation School of Engineering and Applied Science

Jianjin Xu

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Education

Columbia University — New York, NY
M.S. in Computer Science — 8/2019 – 5/2021
Thesis: Semantic Controllable Image Generation in Few-shot Settings
Advisor: Prof. Changxi Zheng

Tsinghua University — Beijing, CN
B.Eng. in Computer Science — 8/2015 – 7/2019
Thesis: Training GANs with the Sunway Taihulight Supercomputer
Advisor: Prof. Guangwen Yang

Research Interests

Generative Adversarial Networks, 3D generative modeling, neural network interpretation

Publications and Manuscripts

Extracting Semantic Knowledge from GANs with Unsupervised Learning
Jianjin Xu, Zhaoxiang Zhang, Xiaolin Hu
Submitted to Conference on Computer Vision and Pattern Recognition 2022 (**CVPR 2022**).

Linear Semantics in Generative Adversarial Networks [paper][project page]
Jianjin Xu, Changxi Zheng
Conference on Computer Vision and Pattern Recognition 2021 (**CVPR 2021**).

Frame Difference-Based Temporal Loss for Video Stylization [paper][project page]
Jianjin Xu, Zheyang Xiong, Xiaolin Hu
ArXiv preprint.

Research Experience

Extracting Semantic Knowledge from GANs with Unsupervised Learning — 6/2021 – 11/2021
Research Assistant at Tsinghua University, supervised by Prof. Xiaolin Hu — *Submitted to CVPR 2022*

- Proposed KLiSH (K-means with Linear Separability Heuristic) to cluster GAN's features by leveraging GAN's linear semantics.
- Instantiated unsupervised fine-grained segmentation and unsupervised semantic-conditional synthesis on various datasets, which are both unattainable with previous methods.

Linear Semantics in Generative Adversarial Networks — 6/2020 – 11/2020
Columbia University, supervised by Prof. Changxi Zheng — *Accepted by CVPR2021*

- Discovered and empirically proved that semantic classes learned by GANs are linearly separable.
- Constructed a linear transformation to extract semantics from GAN's features and showed that it achieved close performance to nonlinear transformations on various GANs.
- Proposed two few-shot image editing applications: semantic-conditional sampling and semantic image editing.

Neural Painter: Smart Image Editing with Simple Line Drawings — 10/2017 – 4/2018
Tsinghua University, supervised by Prof. Xiaolin Hu

- Led a team to build an image editing application capable of editing anime faces guided by simple color strokes.
- Organized the teamwork of dataset filtering, UI design, and backend development and built the core GAN models as 1st project contributor.

Frame Difference Based Temporal Loss for Video Stylization — 6/2017 – 11/2018
Tsinghua University, supervised by Prof. Xiaolin Hu

- Proposed to use frame difference measured on pixel and feature space as a loss to stabilize stylized videos. Compared to the optic flow-based loss baseline, the proposed loss matches the baseline's performance while it is faster and avoids estimating the entire dataset's optic flow.
- Developed an experiment system for evaluation and hosted experiments involving 62 subjects and 25,600 votes.

Unrestricted Vehicle Re-Identification System with Deep Metric Learning 6/2018 – 10/2018

Intership at MSRA, supervised by Lead Researcher Xun Guo

- Developed a re-identification system that inputs raw videos of monitors and identifies re-appeared vehicles. The system first detects vehicles by faster RCNN, then conducts tracking and matching by learned deep metrics.
- Trained the deep metric model on VeRi dataset and validated it on VID dataset and collected traffic videos.

Selected Course Projects

Interactive Editing in Aesthetic Painting Generation System 5/2018 - 6/2018

Course project supervised by Prof. Jia Jia

- Enabled interactive segmentation and image editing using GrabCut, image inpainting using GANs and image fusion using poisson image editing.
- [project page]

Optional Depth Pathway for Mask-RCNN 10/2019 – 1/2020

Course project supervised by Prof. Shuran Song

- Proposed to enhance Mask-RCNN with the ability to take in depth modality optionally such that Mask-RCNN can be trained with both RGB and RGB-D datasets to improve its performance.

Awards

3rd Prize in 36th the Challenge Cup Competition, Tsinghua University 4/2018

2nd Prize in Mathematical Contest in Modeling, 2017 2/2017

Teaching Experience

TA @ Columbia University, COMS-W4995 Special Topics In Computer Science, I: Causal Inference, 2020

Miscellaneous Experience

Chairman of Tsinghua Microsoft Student Club 6/2018-6/2019

Skills

pytorch / tensorflow / python / C++ / javascript / CUDA